B) Remarks:

According to the Office Action, claims 10 - 12 are rejected under 35 U.S.C. 102(b) and claims 13 - 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Publication 11-106770(JP'770) alone or in view of Mandelik (3,771,261) and other references.

However, in view of the foregoing amendments and following remarks, reconsideration is respectfully requested. Claims 10 - 21 should be allowed because new claim 10 of this invention is quite different from JP'770.

In a method for producing town gas, according to new claim 10, the steps comprise preparing dimethyl ether as feed stock, and evaporating the dimethyl ether, and exothermically reforming the dimethyl ether in the presence of catalyst and steam to produce reformed gas containing mainly methane. Such a method for producing town gas is carried out according to the following reaction, theoretically;

$$C_2H_6O \rightarrow 1.5CH_4 + 0.5CO_2$$

The above reforming reaction is highly exothermic. Hence, when the temperature of the reaction system rises excessively, the reforming reaction of the above equation will not proceed toward the right side due to chemical equilibrium. Accordingly, it is desirable to control the reaction temperature by cooling the reaction system adequately. In this invention, steam coexists for reforming reaction of dimethyl ether. The principal purpose of coexistence of steam is to suppress the temperature rise of the reaction system.

On the other hand, JP'770 discloses a method of obtaining a hydrogen gas or a synthetic gas (hydrogen and carbon monoxide) as a fuel for prime movers by the catalytic modification of dimethyl ether with steam. Steam is a component of feed stock in addition to dimethyl ether. As shown in the following reaction, the reforming reaction of the dimethyl ether needs much heat due to endothermic reaction (Section [0012]).

$$C_2H_6O + H_2O \rightarrow 2CO + 4H_2 - 48.9kcal/mol$$

$$C_2H_6O + 3H_2O \rightarrow 2CO_2 + 6H_2 - 29.3kcal/mol$$

As described, the present invention and JP'770 are similar to each other in using dimethyl ether and reforming the dimethyl ether catalytically under the existence of steam. However, while JP'770 premises endothermic reaction to produce a hydrogen gas or a synthetic gas, the present invention premises exothermic reaction to produce a gas containing mainly methane. Accordingly, new claim 10 is different from JP 770 in reaction type and reaction product.

Next, in a method for producing town gas, according to the claim 11 of the present invention, the quantity of the steam for catalytic reforming is within 10/1 to 0.5/1 molar ratio of steam/dimethyl ether. The principal purpose of coexistence of steam is to suppress the temperature rise of the reaction system. It is not economical if the quantity of the steam is beyond 10/1 mole ratio because the coexistence of the steam requires extra thermal energy for heating or cooling the steam, in the whole of the production process of the town gas. Further, it becomes difficult to suppress the temperature rise of the reaction system when the quantity of the steam is under a ratio of 0.5/1.

Further, in a method for producing town gas, according to the claim 12 of the present invention, the temperature for the catalytic reforming of the dimethyl ether is within 200 °C to 600 °C. Such a method prevents deactivation of the catalyst caused by excess temperature rise of the reaction system and proceeds the reforming reaction, smoothly.

On the other hand, in JP 770, the quantity of the steam to be supplied is 1 to 20 mol times the quantity of the dimethyl ether to obtain a high dimethyl ether conversion ratio (Section [0027]). That is, it does not aim at suppressing the temperature rise of the reaction system.

Further, JP'770 discloses that if the reaction temperature is higher than 500 °C, amounts of hydrocarbons, mainly methanol, carbon monoxide or methane, which is by-produced of the reaction, is remarkably increased. In result, the synthetic gas in a product and the rate of the hydrogen are decreased and this is not desirable (Section [0028]).

In JP'770, the reaction temperature is restricted in order to avoid by-producing methane which is not an objective substance. On the contrary, the ultimate object of the present invention is to provide a method for producing town gas, containing mainly methane.

As above described, the present invention and JP'770 are quite different from each other in these objects and operations or effects. Accordingly, claims 10 - 12 of the present invention cannot be rejected based on JP'770 under 35 U.S.C. 102(b).

Further, the claims 13 - 21 of the present invention depend on claim 10 of the present invention. However, claim 10 is quite different from JP'770 as above mentioned. Accordingly, claims 13 - 21 also cannot be rejected based on the combination of JP'770 and the other prior art cited under 35 U.S.C. 103(a).

In view of the foregoing amendments and remarks, it is now believed that this application is in condition for allowance. Accordingly, favorable reconsideration with notice of allowance is requested.

Respectfully submitted,

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